5.18 Similar Shapes (Lengths): 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

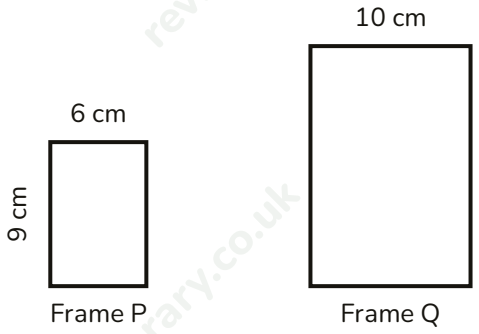
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two rectangular photo frames are mathematically similar. Frame P measures 6 cm by 9 cm. Frame Q is similar to frame P and has a shorter side of length 10 cm. Work out the longer side of Frame Q.

Diagram NOT accurately drawn



(Total for Question 1 is 3 marks)

2 A photocopier enlarges a document using a scale factor of 1.4. The original document has a width of 21 cm. Calculate the width of the enlarged document.

(Total for Question 2 is 2 marks)

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3 A shape is enlarged so that each length is 150% of its original length, creating a mathematically similar shape. A side on the original shape has length 8 cm. Work out the corresponding side length on the enlarged shape.

(Total for Question 3 is 2 marks)

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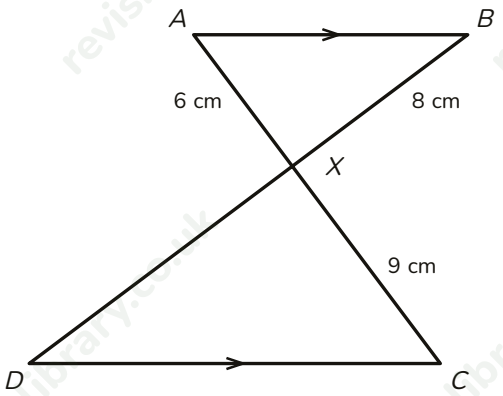
4 Two similar rectangles have dimensions 6 cm by 10 cm and 9 cm by x cm (corresponding sides). Find x.

(Total for Question 4 is 4 marks)

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5 In the diagram, AB is parallel to DC. The straight lines AC and BD intersect at X. AX = 6 cm, XC = 9 cm and BX = 8 cm.

Diagram NOT accurately drawn



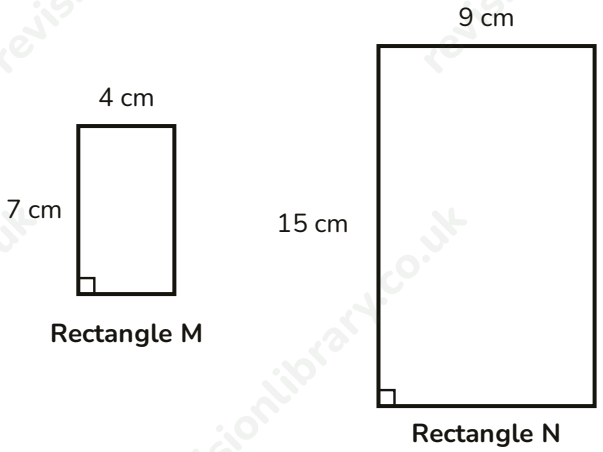
(a) Explain why triangle AXB is similar to triangle CXD. **(1)**

(b) Work out the length of XD. **(3)**

(Total for Question 5 is 4 marks)

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6 Rectangle M has dimensions 4 cm by 7 cm. Rectangle N has dimensions 9 cm by 15 cm. Priya says, 'Rectangle N is an enlargement of rectangle M, so the two rectangles are mathematically similar.' Is Priya correct? Give reasons using the ratios of corresponding sides.



(Total for Question 6 is 3 marks)

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7 A map is drawn to a scale of 1 : 25000.

(a) The distance between two villages, Little Horden and Upper Sowerby, on the map is 8 cm. Work out the real distance between the villages. Give your answer in kilometres. **(2)**

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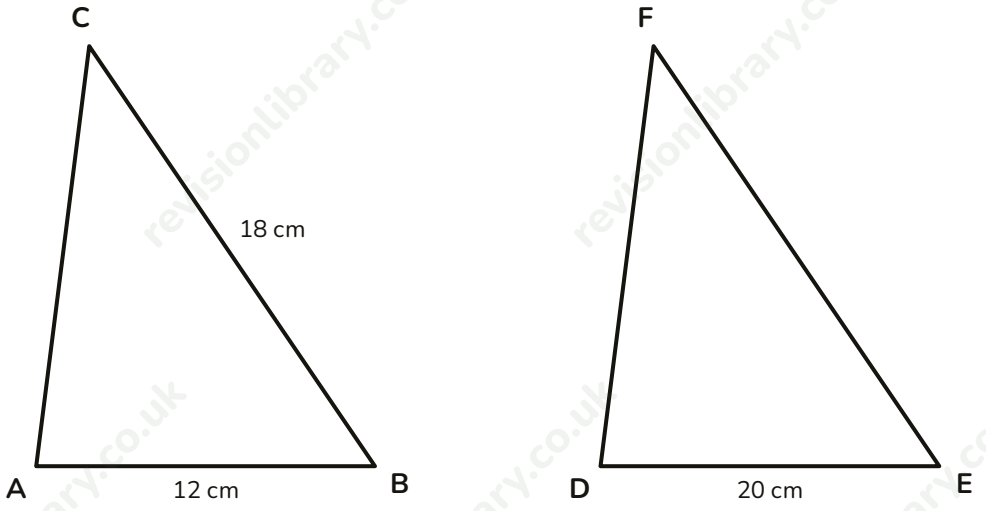
(b) A straight road has a real length of 3 km. Work out the length of this road as it would be shown on the map. Give your answer in centimetres. **(2)**

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(Total for Question 7 is 4 marks)

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8 Triangle ABC is similar to triangle DEF. AB = 12 cm, BC = 18 cm, DE = 20 cm. Find EF. Give your answer correct to 1 decimal place.



(Total for Question 8 is 3 marks)

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Mark scheme · 5.18 Similar Shapes (Lengths): 30-minute Pack

Question 1

scale factor = 10/6 oe (= 5/3)	**M1**
9 x their scale factor	**M1**
15 (cm) cao	**A1**

Answer: 15 cm

Question 2

21 x 1.4 oe	**M1**
29.4 (cm) cao	**A1**

Answer: 29.4 cm

Question 3

8 x 1.5 oe (150% = scale factor 1.5)	**M1**
12 (cm) cao	**A1**

Answer: 12 cm

Question 4

recognise corresponding sides: scale factor 9/6 = 3/2	**M1**
apply scale to other side: x = 10 x 3/2	**M1**
x = 15 cm cao	**A1**
alternative: set up proportion 6/10 = 9/x and solve to get 15 cm	**B1**

Answer: 15 cm.

Question 5

(a) angle XAB = angle XCD and angle XBA = angle XDC (alternate angles, AB parallel to DC), and angle AXB = angle CXD (vertically opposite angles), so the triangles are similar (AA)	**B1**

(a) Answer: Alternate angles (AB parallel to DC) and vertically opposite angles at X give two pairs of equal angles, so the triangles are similar (AA).

(b) AX/XC = BX/XD oe (correct ratio equation set up, e.g. 6/9 = 8/XD)	**M1**
(b) XD = 8 x 9/6 oe (correct rearrangement)	**M1**
(b) 12 (cm) cao	**A1**

(b) Answer: 12 cm

Question 6

9/4 (= 2.25) or 4/9 (= 0.4444...) found	**M1**
15/7 (awrt 2.14) or 7/15 (awrt 0.467) found	**M1**
correct conclusion: No, Priya is not correct, because the ratios of corresponding sides are not equal (2.25 does not equal awrt 2.14), cao	**A1**

Answer: No, Priya is not correct: 9/4 = 2.25 but 15/7 = awrt 2.14, so the ratios are not equal.

Question 7

(a) 8 x 25000 (= 200000) oe (real distance found in cm)	**M1**
(a) 2 (km) cao	**A1**

(a) Answer: 2 km

(b) 3 km converted to 300000 cm oe	**M1**
(b) 12 (cm) cao	**A1**

(b) Answer: 12 cm

Question 8

identify scale factor = DE/AB = 20/12 = 5/3 and apply to BC or set up proportion EF/BC = DE/AB	**M1**
compute EF = 18 x (5/3) or equivalent	**M1**
30.0 cm awrt to 1 dp	**A1**

Answer: 30.0 cm

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